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PROFITS OF EFFICIENCY

In this discussion a definite method is presented for separating the earned returns of efficiency from the wholly unearned surpluses of the market and of goodwill. The view is taken here that efficiency profits are due directly to the entrepreneur's struggle in the technical field to reduce outlays or to increase the quality or quantity of output. In the first place, he may, of course, reduce the costs of production or enlarge the capacity of the technical processes and finally the output of an industry. His efforts result largely in a relative increase of desirable utilities, mainly through an increase in the creative or positive forces of production. In any successful enterprise these forces augment, then, the concrete utilities and the residual surplus of the entrepreneur; and that part of the output which is thereby added is, therefore, described here as the positive profits of utility. These returns constitute the key to any careful analysis of efficiency profits. On the other hand, he may be content to add to an established process only those services which reduce technical and market risks and thus serve merely to preserve the present elements of production and the normal output of an enterprise. Obviously, such measures ward off injurious forces, are preventive rather than constructive, tend to keep an enterprise from falling below the productive margin, and consequently yield the entrepreneur different forms of negative utility profits. These various incomes of concrete utility require careful and critical examination.

Efficiency returns of the first form, then, are from their very nature positive utility profits. They arise only by the creation of added utilities through an increase in the positive forces of production. Whether values are high or low each individual engaged in producing profit is entitled to his own services, to what he alone creates, and hence to any increased utility which may be the result of his own effort. This utility may be measured—according to the nature of his sacrifice—by an increment added to the output or by one taken from the total outlay which was not previously made for protective purposes. Measured in terms of value, this profit is equal to the difference between the expenses per unit of the added output of the intra-marginal producer and the cost of production at the margin. These facts alone are sufficient to distinguish them from what are commonly known as risk and speculative gains.

The origin or present existence of utility profits, which are solely the result of increased positive forces of production, may be given due emphasis in several ways.

1. They often occur as a direct result of the constructive changes which supply much desired products with very little risk to the entrepreneur. Thus the chemist and the physicist are constantly discovering new applications of nature's forces; and after definite scientific methods have been carefully perfected, no great hazard is taken in adopting such new productive processes. It is plain that the corresponding utility profits include that part of the added product which is due to increased advantages not counterbalanced by frequent risk losses.

2. Again, the law recognizes the existence of positive utility profits by the manner in which it guards the legitimate trade secrets of the entrepreneur. By way of illustration, an implied contract is presumed to exist between men who jointly venture, or assume confidential relations in a business, that they will not reveal trade secrets imparted to them. This legal principle has preserved for many a shrewd enterpriser the hard-earned rewards of his own efforts.

3. It has also been emphasized by American judges that the inventor, whether he be workman, manager, or partner in an enterprise, may exercise this part of the entrepreneur's function with full assurance that he will be protected in realizing the profits of his invention and discovery. In fact, unless there is a particular contract to the contrary, an employer can secure nothing more than a shop right to any invention that his workmen may have made.

4. The profits of efficiency are also protected by trade-marks which are usually affixed to secret preparations. If an article is manufactured under a valid trade-mark neither the process nor the mark may be used by competitors.

5. In no less degree, the law has recognized efficiency profits in the patent systems of England and the United States; for without the inventive power there would have been no patent law. It is in recognition of this peculiar ability that the state undertakes to guarantee to every man for a limited period the exclusive manufacture and sale of his own product. Obviously, the great number of patents issued annually furnish abundant evidence of the efforts put forth by thousands of inventive minds to secure greater utility profits, which are determined by a better or greater total output.

Positive utility profits of this kind accumulate with great rapidity in commerce, transportation, and manufacturing industries, but especially so when enterprises are in the state of increasing returns at an increasing rate. Thus in the competition between parallel railroads for freight traffic, utility profits are augmented with increased patronage, and rates may be established for the more successful lines upon a cost basis. The public gains, of course, through the competitive struggle under the laws of efficiency; for rates constantly tend to decline. Nevertheless, in no other case are profits of this description so plainly the result of ceaseless energy and constant sacrifices, multiplied in the race for wealth and power—the real income of enterprise.

In agriculture, however, positive utility profits are so closely associated either with the speculative surplus or with rent that writers often fail to distinguish them. In opposition to the scarcity and the niggardliness of land is to be reckoned the increased efficiency of improvements which reward the entrepreneur in the profits of utility. An improvement in agriculture may be subject either to the law of an increasing rate or of a diminishing rate; which, at first, must result in an efficiency profit to the tenant. However, in some instances such differential gains may be transferred to the landlord because of peculiar circumstances. Two examples here will suffice. A tenant was able, by a unique device and the use of dynamite, to drain a swamp and thereby increase its value tenfold. Another by sinking tubular wells in Colorado made possible the irrigation of wild land. In each of these instances the advantages of increased production went ultimately to the landlord, although some part of the increased output was undoubtedly justly due the tenants as positive utility profits. New natural forces were in each instance brought into operation, and from these the landlord was, of course, entitled to rent; but for their utilization and the sacrifices of invention the tenant should have received a fair return.

Efficiency returns of the second general group, which we are here describing as negative utility gains, appear whenever the entrepreneur is seriously engaged in the task of preserving his product—that is, both the industry and the output. Such efficiency profits are, therefore, due mainly to his successful struggle against chance or uncertainty and to his elimination of some important negative element. It is probably plain that a New York merchant who is able by introducing an automatic system of fire

protection to effect a reduction of fifteen thousand dollars a year in his insurance cost is adding that much to profits. If a vessel loaded with perishable freight becomes stranded, the element of risk outweighs all other considerations; every effort is made to rescue both cargo and vessel. Partial destruction often occurs and the immediate object is to reduce risk losses. Furthermore, desperate efforts have recently been made to protect crops from the ravages of insects, and stock from sudden epidemic. In like manner any defensive measure in production is an effort to prevent a risk loss; for to relinquish a technical advantage, after it has once been secured, means increasing risk and necessary loss.

In this second class of efficiency returns are to be described, first, the important internal risk profits of an enterprise. Such gains in utility come by reducing the losses from certain internal economies of production. All protective measures used for the preservation of the physical properties of the output or the process itself are to be counted as internal economies, and this particular group of negative utility profits arises from efforts which preserve the concrete product and prevent its destruction or deterioration. Thus thick walls preserve the ice contained in the refrigerator car; and the ice in turn preserves the fruit or meat placed therein. Again, the outlays required in such measures as spraying fruit trees or grain stored in elevators to kill insect pests are to be counted as sacrifices of production. In fact, these constitute a form of risk costs. The immense expenditure in the United States for protective measures may be seen in the extensive building of dikes, ditches, and canals. At many points it is necessary to construct wharves and warehouses for storing commodities. And in no less degree are the mine and farm owners called upon to protect the products of the earth. All outlays of this nature eliminate a negative element or force; and are obviously to be separated by careful analysis from those costs which increase the positive forces of production. In fine, the first are definite outlays against risks, and as such serve to reduce the losses of a business.

A strong contrast exists here between positive utility, and internal risk, profits. Positive utility profits have their origin in the production of added salable commodities at the prevailing price, while this particular risk profit is the result of preserving or redeeming such utilities from threatened loss or disuse. Dredges used in building canals for carrying commerce create new wealth;

but the same means used to draw off water from a partly submerged city is only a protective measure. Again, a hydrant may serve to augment positive utility profits by bringing new areas under cultivation; or as a method of protection it may be needed to save a fire-stricken section. Positive utility profits accrue when a second or third shift of laborers is added to an enterprise; but the number of accidents to each man will be even greater than before, and consequently the cost of insurance or of safety devices will increase. Now it is to be noted that positive utility gains and internal risk profits may be the result of two different processes, as in the illustrations given above. The first gains usually originate in the main process of production, but their preservation is often due to some secondary means. Consequently, the risk profits of utility in the secondary process are frequently equivalent to previous risk costs or losses in the first group of returns. However, when utility-forming and risk-eliminating processes are closely associated, the task of separating positive utility gains from risk utility profits is much more difficult; for example, the treating of wheat before planting or inoculation of alfalfa seed to avoid subsequent loss. If a veterinarian arrives just in time to save a sick horse, he creates a much desired utility for which he is given a corresponding compensation; and the owner of the horse has, perhaps, saved its entire cost and efficiency to himself. That is, internal risk profits of an enterprise are simply utilities, measured in terms of marginal cost, which have been saved from loss, deterioration, or destruction. A positive utility profit is the direct result of an added productive force; a risk profit is a utility profit rescued from destruction. If a utility saved by a certain act or process cannot, however, be separated from accompanying losses, its creation undoubtedly prevents a still greater loss; and, while not adding a surplus utility, it does, nevertheless, establish a negative gain or profit. This last rule is well established in law, for it is used in courts of equity to measure differential profits.

Now the entrepreneur is usually drawn into a new field by the prospect of both positive and risk utility profits; and, as such returns are limited finally by his operations under the technical laws of efficiency, they become, as will be seen, costs of production and price determining. That is to say, his chief purpose is not to assume risks but to avoid the burden of taking them. Opportunity to increase commodities at little risk, as in the lumbering

industry, attracts large investments. But as a rule such utility profits must be sufficient to induce entrepreneurs to enter new fields or to make alterations in their processes of production. On this ground, they are costs measured by the entrepreneur's estimate of his own services. Stated concisely, to secure the added output, the undertaker is usually obliged to assume greater proportionate outlays because of these technical laws and to accept a less rate of profit. Though he receives a greater total profit, his costs rapidly approach the competitive plane. Consequently, the general attitude of entrepreneurs toward enlarging their output usually regulates these profits of utility. Still, because of hidden risks this gain is less at times than the undertaker may have expected.

In case costs per unit of product rise with such increased risks, an enterprise can only adjust its expenses to the prevailing price by reducing its output. And the flexibility of an enterprise allows this process to go on until the extensive margin is reached. In other words, as the point of highest rate of profit in a flexible enterprise is also that of lowest cost per unit of output, increasing risk costs or losses may gradually compel the producer to diminish his total product until this point finally coincides with costs at the extensive margin. Certain it is, that this marginal enterprise assists at this point in the determination of price. For whether price is stationary or constantly changing, the total output cannot be secured at a lower expense; and as such risk costs are a definite barrier to a further increase in production they are, therefore, price determining. On the other hand, with the invention of a device that reduces losses, internal risk gains or profits are accumulated; and an enterprise may then increase its output with a greater total profit at some point above that of minimum efficiency. That is, the enterprise is now above the extensive margin and, as an intra-marginal unit, its accumulation of profits is checked only by the competition of others. Hence, in such instances both positive and negative utility profits are finally determined at the point of greatest net output. Above all, the operation of the technical laws of efficiency, in the usual adjustment of productive processes, establishes a general *cost line* which, under freely competitive conditions, separates utility profits from unearned gains, and makes the former price determining.

The second class of negative utility gains are external risk profits. These are obtained by overcoming losses in the external economies of production. Measures taken to prevent (a) the

fluctuation of money costs in outlays or to secure (b) a permanent market for finished goods generally decrease risk losses. It will thus be seen that external risk profits are of two distinct kinds, and that they depend directly upon overcoming the speculative elements in purchasing the factors of production and in selling the finished product. In the first place, such losses are reduced by long-period contracts which fix wages; by the importation of laborers; by the purchase or lease of mineral, timbered, and ranch lands to secure raw products; and by establishing or purchasing enterprises supplying needed materials. A case in point is that of a steel corporation which has purchased mineral lands in Minnesota; it is now securing its iron ore at seventy-five cents a ton. This company no longer fears the risks from the fluctuations in the price of iron ore. A small part of such expenditures, as this particular investment in mineral land indicates, should be counted as insurance against loss. It is patent that where industries are thus united by contract or purchase, the injury to society by combination and integration of related enterprises appears only when they are able, after having secured the economies of efficiency, to force values permanently above the cost of production, as determined by the laws of efficiency. Efficiency profits from overcoming external risks are then obscured by the appearance of unearned artificial gains. From the legal standpoint, however, such contracts are valid until there is tangible evidence that they have become the basis of a monopoly.¹

On the other hand, external risk profits are also due to a judicious expenditure in perpetuating the demand for a commodity or in establishing a fixed market by increasing the goodwill of a business. The cost of advertising, which amounts at times to considerable sums, should be included here. But far more important to such risk profits are the contracts by which all of a customer's patronage is secured. Or again, of like nature is the agreement of a wholesale merchant that he will sell a certain commodity to but one dealer in a designated city or state.² It was not illegal

¹ In this connection, we may note that such contracts were used to control the supply of lumber in certain counties in California, and of grain bags in another part of the same state. Similar contracts regulating the amount of coal shipped to Elmira, New York, were declared void as being against public policy. In this respect, a combination based upon agreement generally affects risk profits over a wider area than does one based upon purchase of much needed industries.

² *Clark v. Crosby*, 37 Vt. 188; *Newell v. Myendorff*, 9 Montana 254; *Keith Optical Co.*, 48 Ark. 139; *Roller v. Ott*, 14 Kan. 615, 616.

for a railroad company in Missouri to bind itself, in return for wharf privileges, to send all of its freight and passenger traffic over a certain ferry line;³ or in Indiana for a saloon-keeper to agree to purchase his stock of beer from a prescribed brewery.⁴ No less important are the agreements between retail dealers to compel wholesale merchants to remain entirely out of retail business; for the courts in these cases were of the opinion that it is often legal to make contracts for the express purpose of decreasing the profits of others.⁵ Obviously, such contracts secure a definite and reliable market for the output of an enterprise at a small risk expense. Moreover, this outlay reduces the losses arising from delayed or irregular sales, and whatever sum is saved under freely competitive conditions may be credited⁶ as an efficiency profit to this form of contract. Despite this advantage, however, it is certain that trade channels often become fixed by such arrangements, competition is restrained, and not seldom these agreements enhance prices and form monopolies.⁷ Yet in many cases uniform prices extending over wide areas, which have been established by agreement or custom, illustrate only the inevitable effort of men to overcome external risk losses.

Certain it is that the public is unable to discriminate between the earned and unearned returns of large enterprises; and economic writers whose peculiar duty it is to investigate this phase of modern industry have neglected the various forms of legal profits. It is just at this point that juristic opinions furnish important material for discerning economists. In fact, that branch of the law which relates especially to patented inventions makes easier the task of distinguishing the foregoing efficiency profits; for in this field such returns are often reckoned upon the producing capacity of the concrete process. If one producer uses unlawfully a patented article or process owned by another, he becomes an infringer upon the latter's rights and may be held legally responsible for the gain made by the infringement. In estimating

³ *The Wiggins Ferry Co. v. Chicago and Alton R. R.*, 73 Mo. 390, 405.

⁴ *Ferris v. Brewing Co.*, 155 Ind. 539.

⁵ *Bonn Mfg. Co. v. Hollis*, 54 Minn. 233; *Ertz v. Produce Exchange*, 79 Minn. 144; *Macaulay Bros. v. Tierney*, 19 R. I. 259. See, however, *Jackson v. Stanfield*, 137 Ind. 615; *Brown v. Jacob's Pharmacy Co.*, 115 Ga. 442.

⁶ When such contracts are broken, the plaintiff is usually allowed to collect his prospective profits in the form of damages.

⁷ *Boutwell v. Mars*, 71 Vt. 1; *Olive v. Van Patten*, 7 Tex. Civ. App. 630; *Judd v. Harrington*, 139 N. Y. 105.

these profits a definite rule is followed. The advantage which this first entrepreneur derives from using the patented device over that accruing from any other process known prior to that invention, in accomplishing exactly the same result, constitutes the profits which the complainant is entitled to recover.⁸ Thus in the case of the Cawood patent⁹ a certain railroad had used, without the inventor's permission, a patented swage-block for the purpose of repairing the ends of steel rails which had become exfoliated by wear. It was held by the court that the gain in mending rails by the use of the patented implement compared with the cost of mending them on a common anvil, including the saving in fuel and labor, was the proper measure of damages. Needless to say, other examples might be selected to emphasize this method of determining efficiency profits by the use of a legal standard of comparison, which in each case is the next most efficient process giving the desired result.¹⁰

If only the patented process under consideration and one other would serve the particular purpose of production in any case, we should have the stock illustration of the economist. That is, the latter process would determine the extensive margin of production from which the efficiency profits of the former would be measured. And inventions are not so varied or so numerous that examples of this are infrequent. As we have observed, the defendant under the Cawood patent was obliged to pay the difference between the expense of repairing his rails by the patented process and that which he would have incurred had he used a common anvil. Either the outlay of swaging them on an anvil or of rerolling them should be taken as the marginal expense of production.¹¹ In *Thomson v. Wooster* the master in chancery allowed the complainant all the profits which the defendant had made by the use of a patented machine in folding strips of cloth over what his expense would have been in having the same tasks done by hand.¹² In still another instance, the decreased expense of splitting wood by a patented device, in comparison with doing

⁸ *Cawood Patent*, 94 U. S. 710; *Mevs v. Conover*, 125 U. S. 144, note; *Tilghman v. Proctor*, 125 U. S. 144; *Mowry v. Whitney*, 14 Wallace 649; *Sessions v. Romadka*, 145 U. S. 49.

⁹ 94 U. S. 695, 710.

¹⁰ See *Mowry v. Whitney*, 14 Wallace, 649; *Williams v. Rome and Ogdensburg Railroad Company*, 18 Blatch. 185.

¹¹ 94 U. S. 710.

¹² 114 U. S. 116.

it by hand, has resulted in a differential gain for the owner of the invention.¹³ A similar case is that of *Sessions v. Romadka*. The advantage secured by the defendant consisted in the difference between the cost of making certain patented fasteners, which he had used in manufacturing trunks, and the greater outlay for straps, buckles, and dowels, previously used for the same purpose. In cases of this character, the differential advantages or profits have in some instances been measured in positive gains, but in others there has been only a reduction of prospective losses. Yet the differential advantage forms in each case the court's measure of the inventor's legal profits.

Indeed, emphasis may be placed upon the different forms of efficiency profits and their practical significance by referring to the decisions of certain cases which illustrate this rule. For example, positive utility profits are obtained in all those instances in which the differential advantage of the patented process over the less efficient ones is so marked that a greater surplus output results from its use.¹⁴ It is often true that the utility profits so obtained are produced from materials which otherwise would be useless or of little value in other processes.¹⁵ The methods of the inventor have then brought into use new technical forces, and his rewards consist almost entirely of prospective utility profits. In the end, however, the final output depends upon the superiority of the truly positive, over the noncreative, forces of production. But if this product is the result of several independent acts, the utility profits of one process are often counterbalanced by losses from other methods in the same enterprise. There has, however, been a negative gain over the opposing elements of nature.

It seems necessary to illustrate this last statement with several examples. In an important suit, the defendant had for several months used independently several solvents, including a patented process, in the treatment of pyroxyline. Because of a defect in the pyroxyline the various treatments were unsuccessful and the resulting products could not be sold at a profit. Nevertheless, the master in chancery decided that as the patented solvent was much cheaper than the others used, the defendant saved a sum

¹³ *Mess v. Conover*, 125 U. S. 144 note.

¹⁴ *Piper v. Brown*, 1 Holmes, 198; *Rubber Co. v. Goodyear*, 9 Wallace, 801; *Elizabeth v. Pavement Co.*, 97 U. S. 138; *Tatham v. Lowber*, 4 Blatch., 87; *New York Grape Sugar Co. v. American Grape Sugar Co.*, Fed. Rep. 456.

¹⁵ *Rubber Co. v. Goodyear*, 9 Wallace 801; *Elizabeth v. Pavement Co.*, 97 U. S. 141.

which the complainant was entitled to recover as profits. "From these findings," declared the court, "it is apparent that, to the extent the defendant used the patented solvent, the use of the other was superseded in its experiments and operations in treating pyroxyline. The case is therefore one where, by the use of the patented invention, the defendant has been saved a greater loss than it otherwise would have sustained. To this extent it has derived an advantage by the use of the patent."¹⁶ Again, in the case of *Mevs v. Conover* there was a saving of labor in splitting kindling-wood by means of a patented machine in comparison with the work of doing the same task by hand. No actual profit was made by the infringer of the patent, it was claimed, but the court decided that "his loss was less to the extent of seventy-five cents on each cord split, than it would have been had he not used the patented invention." It seems that a similar decision was first reached in *Black v. Thorne*,¹⁷ which was later reversed on the ground that there was no positive proof that the defendants in the case had made any profits whatever from the use of the plaintiff's patented improvements.

In not a few decisions we find that reference is made both to (a) the saving from decreased costs and to (b) the addition of positive utilities. These facts illustrate two important forms of positive utility profits. Thus in *Tilghman v. Proctor* it was found that in the manufacture of glycerine, a certain patented process was superior to any other known method. It had saved the defendant in the use of lime and sulphuric acid the sum of \$182,731, while there had also been a gain in the production of glycerine amounting to \$62,000. And again, in determining the profits from an unauthorized use of a patented invention for the purpose of manufacturing oxide of zinc from zinc ores, the master in chancery made a careful computation of the (a) coal and labor saved by the new process, (b) the increased amount of oxide of zinc obtained by it from a given weight of ore, and (c) the quantity of residuum available for renewed treatment which was also saved to the manufacturer after his adoption of the new process. These facts certainly furnished the court with accurate information concerning the direct saving in expenses of production and the amount added to the total output of utility profits over other processes. Yet, strange to say, the court rejected these rather

¹⁶ *Celluloid Mfg. Co. v. Cellonite Mfg. Co.*, Fed. Rep. 478.

¹⁷ 111 U. S. 123.

refined calculations which undoubtedly proved the great superiority of the patented process. The decisive objections to the master's report, as given by the court, were that the result, thus obtained, necessarily fluctuated with the varying richness of the ore treated, and that the defendants were charged with the third item to which no value was given by the patented process. "The simplest and most appropriate method is," stated the court, "to ascertain the quantity of oxide obtained by the use of the complainants' process, and the cost of its production, and comparing this with the cost of producing a like quantity by the muffle process, the difference is the saving due to the former."¹⁸ Of the two methods presented here, it is obvious to one familiar with the treatment of ores that the former one was much the more accurate and scientific. In selecting the figures showing the comparative costs of producing one hundred pounds of oxide under both the old and the new processes no account seems to have been taken by the court of the quantity of ore wasted under the old process. In the master's estimate we have, on the other hand, a distinct statement of the savings of ore formerly wasted, and also the added profits from an increased proportion of oxide from the ore used. In fact, the method presented by the master resembles very closely that used to determine the profits of the defendant in *Tilghman v. Proctor*.

However, if the patented process has effected at most only the preservation of an added product, or a saving from what would otherwise have been a loss, the advantage in the form of output may really be measured or estimated as internal risk profits. This follows from the fact that a risk profit is a utility profit which has been saved from destruction or loss. Thus, for example, in *Piper v. Brown*¹⁹ certain fish, which under other circumstances would have spoiled, were so well preserved by a patented process that they were disposed of at a normal profit.²⁰ In the case of the Cawood patent otherwise useless rails were again made serviceable, and the invention clearly saved a risk profit. It was, indeed, argued that no profits were made by the use of the patented process and that it would have been more economical if the rails had been rerolled before again being laid. Upon this point, however, the court was not to be turned from the rule relating to

¹⁸ *Wetherill v. Zinc Co.*, 1 Bann. and Arden, 487, 488.

¹⁹ 1 Holmes 198.

²⁰ See *Piper v. Moon*, 91 U. S. 44.

the existence of a differential advantage.²¹ In fact, in the various circumstances in which a process simply saves what would otherwise have been a loss, this saving has often come, not from added utility, but from lessened costs of preventive measures; and the decreased loss may be taken as adding to the entrepreneur's risk profit. In reviewing many cases, one is struck by the large number of instances in which risk returns were found to be present, though no profits were obtained from the general business. This fact emphasizes again the important place held generally by internal risk profits in manufacturing industries.

Whether the differential advantage of an invention rests mainly upon an increase in positive utility, or in risk profits, the rule of division between the infringer, who merely uses unlawfully the protected process, and the patentee is obviously plain. The latter possesses here no legal right to the surplus speculative profits of his patented device or to the returns from any other elements of the business. At times the expense of production under a patented process and other outlays cannot be differentiated, and the plaintiff is then allowed all profits accruing from the entire process. But the rule is nevertheless inflexible; the latter is entitled only to the earned increment which is equivalent to his economic advantages measured in costs over the standard of comparison. It is the custom for the latter to select what he considers the proper standard, and to present proof of the resulting advantages which the defendant derived from infringing upon his invention. The defendant, on the other hand, may accept the standard so selected, or he may set up one more favorable to himself. But in any case, the final award by the court rests upon appropriate and pertinent evidence pertaining to the utility and superiority of this invention over old modes or devices that have been used for working out

²¹ "The argument is plausible," runs the opinion, "but it is unsound. Assuming that experience has demonstrated what is claimed, the defendants undertook to repair their injured rails. They had the choice of repairing them on the common anvil or on the complainant's machine. By selecting the latter, they saved a large part of what they must have expended in the use of the former. To that extent they had a positive advantage, growing out of their invasion of the complainant's patent. If their general business was unprofitable, it was the less so in consequence of their use of the plaintiff's property. They gained, therefore, to the extent that they saved themselves from loss. In settling an account between a patentee and an infringer of the patent, the question is, not what profits the latter has made in his business, or from his manner of conducting it, but what advantage has he derived from his use of the patented invention" (94 U. S. 710).

similar results. In the words of a learned judge the economic principle is stated most concisely: "The fruits of that advantage are his profits."²²

These simple rules for determining the profits of invention have made it clear that in at least one class of cases, the profits of efficiency have been frequently separated from the unearned surpluses of goodwill and monopoly. Now it is obvious that if proper provisions were made in the patent law, the rule so applied here might be extended to other instances. Without considering the ethical phase of the question, if public policy demanded such a differentiation for the purpose of giving to the state the unearned speculative profits of patent monopolies, the same distinction could be made between such returns in a large number of cases, or in any legally protected industry. Courts of law are determining every day the profits of businesses according to the well established rules of a political economy which are peculiar to their procedure; and the gains from differential advantages, goodwill, and monopoly are not new concepts to them, nor even ideas clothed in new terminology. That is to say, upon purely scientific grounds, the surpluses of monopoly and coercive restraint of trade may be made to stand apart from the proper rewards of dynamic efficiency.

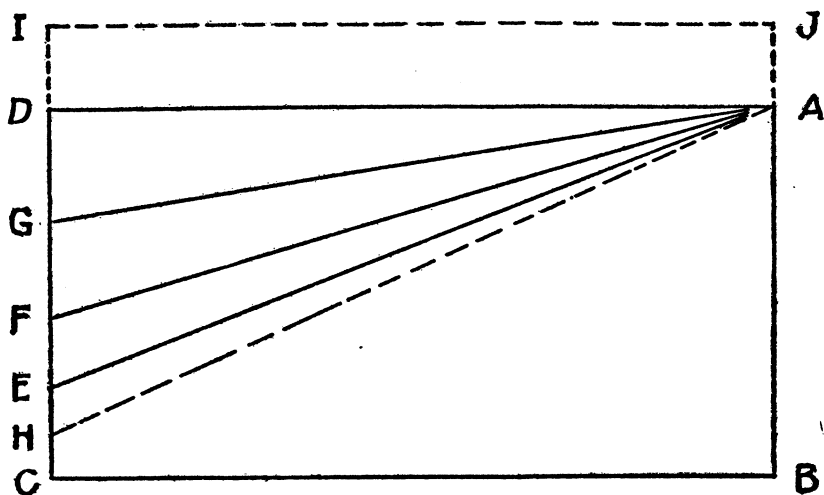
Let us turn now to a third class of negative utility gains which are defined here as subjective risk profits. In practice this increment is being gradually recognized by both jurists and economists. But so far, this study of efficiency profits has been naturally obscured by the existence of a peculiar risk cost; for a mental sacrifice appears concomitant with the rise and decline of every productive process. Every new method is an experiment, and is usually accompanied by some anxiety. In fact, the original risk is so great that the fate of an entire enterprise often hangs in the balance. We have noted in previous cases that despite the use of patented processes several enterprises operated at a loss. After long tests, many patents are found to be commercially worthless, bringing naught but anxiety and loss to the inventor. If in the course of time, however, a process is firmly established, this mental strain gradually disappears, though some risk losses still continue. Again, as a single enterprise declines in

²² See *Suffolk Co. v. Hayden*, 3 Wall 320; *Brickill v. Mayor of New York*, 112 Fed. Rep. 71; *Mowry v. Higgins*, 43 Fed. Rep. 675.

efficiency or is distanced by more successful competitors, this risk burden reappears and the entrepreneur's worry increases in proportion to the risks taken and the amount at stake. Obviously his compensation for carrying risk losses and this *mental burden* must increase as his business grows less efficient. The common practice of balancing the gains of one class of commodities against the losses of another conceals the source of important risks, but where risks and losses are fully recognized the mental stress of fear and anxiety tends to limit supply until prices rise ultimately to the necessary cost level. Now it is to be noted that as the more efficient entrepreneur reduces these risk losses and the accompanying worry and anxiety, he secures two additional risk profits. There is, first of all, a gain from the increment necessary to compensate producers generally for undergoing the mental stress concomitant with risk. Indeed, the risks and anxiety common to all of the enterprises of a single kind limit to some extent the number of producers to be found therein. Consequently, by reducing in a single enterprise such industrial hazards and the accompanying mental strain, the usual or common compensation for the latter becomes in this case a profit of efficiency. This is the first form of subjective risk profit. Finally, his second gain from this source is somewhat different. Doubtless one would admit that the decrease in worry and care would permit the entrepreneur to give more attention to the dynamic function or the improvement of a definite industry. There is, then, a second gain from the increase in time, energy, and improvements made possible by the elimination of mental stress in particular enterprises. In other words, by way of contrast, risk losses and mental strain decrease for the more efficient entrepreneur; while risk costs as well as losses and the mental burden increase in the declining enterprises, and form a substantial basis for the marginal entrepreneur's economic sacrifice and, therefore, of minimum profits.

The general plan of profits presented here may be illustrated by the accompanying figure. Passing from right to left, the rectangle *ABCD* may be taken to indicate the varying expenses and efficiency profits of production in a group of competing industries from the marginal producer at *A* to the most efficient entrepreneur at *EC*. Beginning at *A*, the increasing sums going to wages of management of the more productive entrepreneurs may be represented comparatively by the triangle *AEF*. Stated con-

cisely, such wages are measured approximately by what the entrepreneur could get by entering the employment of some other person in the same industry. Wages of management do not, therefore, in a narrow sense include risk profits. Subjective risk profits, however, enter largely into minimum return profits. And as any minimum profit which the entrepreneur will accept and still remain in the industry will, therefore, be something more than mere wages of management, it may be represented by the two increments in the larger triangle *AEG*. If the entrepreneur did not manage his own business, his net profit would not, of course, include such wages. As each entrepreneur receives a differential minimum profit, according to the amount necessary to retain him permanently in the industry, such returns have been arranged here in an ascending scale from *A* to *G*. But the profit necessary to induce an entrepreneur to enter or to improve an enterprise must be something more than that necessary to retain him after he has become firmly established in it. True, men are usually attracted to a new field largely by prospective profits; but under freely competitive conditions, differential returns will



finally be determined by the plane of competition represented here by *AD*. Consequently, in a static industry, these become gains of efficiency measured approximately by *AFD*. And, as such utility profits are absolutely necessary to induce entrepreneurs to assume added investments, they become costs of production. So im-

portant are these in establishing theoretically the competitive plane and the demarcation of earned and unearned increments that this diagram may be taken as representing a detailed analysis of them as they occur in a static state.

The competitive plane thus becomes the natural line of division between the cost of production and the scarcity surplus; and there is added proof here that efficiency profits become costs of production. For example, every successful entrepreneur tends to expand outlays and output until his intensive margin of production coincides theoretically with this line; the latter becomes, therefore, a uniform plane of marginal costs. Clearly enough, it represents the normal level of competition between enterprises, the natural price of the English classical economists, and the cost price of the English common law. By tracing it again in theory, law, and industry, as the natural division between the profits of efficiency and the scarcity surplus, the first step is taken in differentiating the unearned increments of contractual restraint upon trade, monopolized advantages, and exploitative enterprises. Such increments are represented by the rectangle *ADIJ*. They are usually scarcity surpluses which accumulate by equal accretions upon individual units of product to pass finally to the landlord as contractual rents. The latter are indicated in this figure by the triangle *AEH*, as rent expenses of production. There is room in economic theory for both the scarcity and the productivity concepts of rent, but in this article we are interested mainly in the relation of scarcity rents to the plane of competition.

That the earned increments of the entrepreneur may finally be distinguished from his other incomes, the previous analysis of profits has made prominent the exact nature of efficiency returns. Such profits of efficiency are largely the reward of energies confined to the dynamic field and are equal to the net output measured in terms of marginal cost. During a long period of falling prices, they are determined by the difference between his own expenses per unit of product and those of the marginal entrepreneur in the same vicinity. Obviously, the undertaker's unearned gains are what he receives in the residual surplus above wages and the profits of efficiency.

It is therefore plain that between the English classical theory and the modern surplus concept of profits, between the internal and external economies of production, and between the efficiency and speculative profits of enterprise, may be drawn a line which

will differentiate the earned from the unearned incomes of the entrepreneur. This demarcation is of great importance in attacking intelligently modern economic questions; for it is plain that on one side are to be included positive utility, and the three forms of negative utility, profits; while beyond this line lie the speculative, monopoly, and exploitative increments, which have made these problems of such great interest to the entrepreneur.

Now the relation of the state to these various increments makes the demarcation still more important. Through the expenditure of vast sums, the state endeavors to aid the entrepreneur in production that he may secure greater utility profits. In the use of somewhat smaller sums, it seeks to protect and preserve the output, eliminate internal risk losses, and thereby increase risk profits. By means of various bulletins and reports, it attempts to conserve the external risk gains by aiding the producer to correlate his supply to demand. But beyond this line of demarcation the state ceases to lend the entrepreneur its assistance; its position, in fact, is suddenly reversed, for the well known speculative, monopoly, and rent increments are not to be encouraged by legislation. It would appear that its duty to the consumer lies rather in furthering as far as possible their elimination. Contrasted in other words, the state suppresses monopoly gains by legalizing the efficiency profits of certain coöperative combinations that preserve competition. It seeks to reduce the rent increments of the highly populated districts by encouraging greater production and higher utility profits in other sections. It passes laws to do away with the surpluses of speculation; and endeavors to prevent restraint of trade that the innocent investor and the original producer may not suffer discouraging risk losses but receive proper efficiency rewards for their efforts. Finally, on this competitive line of demarcation between the earned and the unearned increments is to be fought out, with more or less persistence, one of the greatest struggles of the industrial world.

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